10

Naval Air Station Adak

Adak Island, Alaska
CERCLIS #AK7170090099

Site Exposure Potential

The Naval Air Station (NAS) Adak site is located on Adak Island, Alaska, near the center of the Aleutian Island chain (Figure 1) about 1,950 km southwest of Anchorage (ESEI 1986). Adak Island is part of the Andreanof Group of the Aleutian Island Chain, which separates the Bering Sea from the Pacific Ocean. NAS Adak occupies 24,705 hectares on the northern portion of the island and is surrounded by the Bering Sea. Drainage from NAS Adak flows into Kuluk Bay, Sweeper Cove, Shagak Bay, and the Bering Sea.

NAS Adak provides services and material support for aviation activities and operating forces of the U.S. Navy. During an Initial Assessment Study, 32 potentially contaminated waste sites were identified at NAS Adak (ESEI 1986). Before the base was proposed for addition to the National Priorities List, the U.S. Navy began a RI for seven sites that were found to pose serious threats to human health or the environment (URS 1991). The seven sites include Palisades Lake Landfill, Old Hazardous Waste Storage Area, Firefighting Training Area and Burn Pits, Power Plant No. 3 and Waste Oil Pit, Trout Creek Disposal Area, White Alice Quarry Disposal Area,

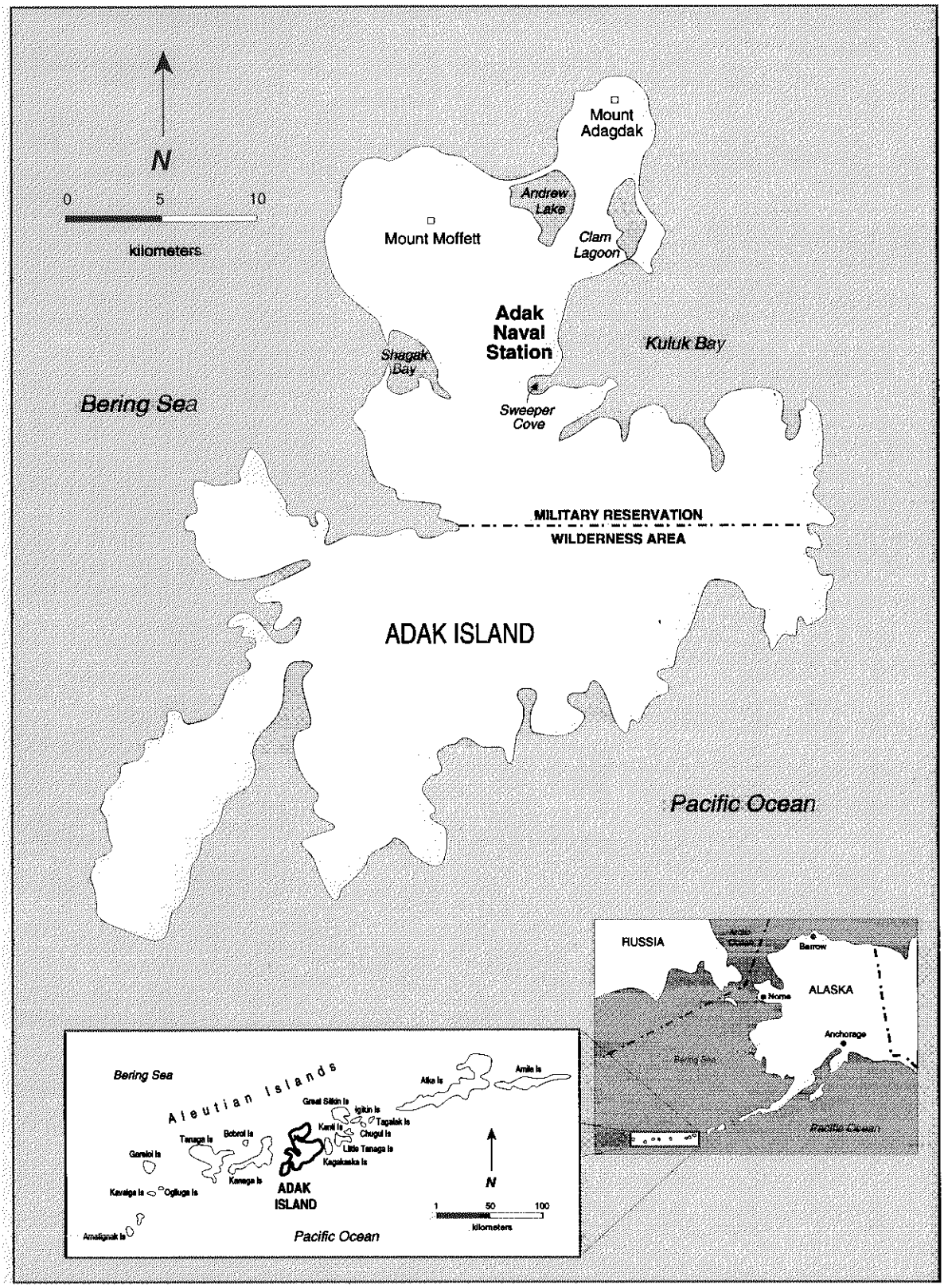

Figure 1. NAS Adak, Adak Island, Alaska (URS 1991).

and White Alice PCB Spill Area (Table 1). In addition, a March 1991 RCRA Facility Assessment identified eight solid waste management units, several of which are included in the seven RI sites.

Surface water runoff and groundwater migration are the potential pathways of contaminant transport from the waste sites to NOAA trust resource habitats. Surficial soils on Adak Island consist of silty-clayey sands, gravel, and volcanic ash from 1.5 to 15 m deep. These soils range from impermeable volcanic ash to highly permeable sands and gravels. Underlying the soils are predominantly impermeable materials of volcanic origin. The geologic formations beneath the site are not conducive to aquifer development, although there may be water-bearing zones in localized unconsolidated deposits throughout the site. Localized groundwater flow in shallow water table aquifers would be expected to move toward nearby streams, lakes, and bays (ESEI 1986).

Table 1. Major activities and associated wastes at seven sites located at NAS Adak.

Site	Activity	Types of Waste
Site 11: Palisades Lake Landfill	1940s to 1970: Primary disposal area on Adak Island (2 hectares, 1.5 m deep).	Petroleum, oils, lubricants (1,700,000 l); chlorinated solvents (230,000 l); nonchlorinated solvents (180,000 l); paint waste, sanitary trash, lead and mercury batteries (8,400 total), construction debris, and mercury (23 kg).
Site 15: Old Hazardous Waste Storage Area	1950s to 1984: Storage yard for supplies (0.7 hectares).	Materials stored included paints, chlorinated and nonchlorinated solvents, transformers, and oils. Approximately 570 l of transformer oils containing PCBs were spilled.
Site 16: Firefighting Training Area and Burn Pits	1970 to 1989: Three burn pits were utilized for firefighting training and waste oil disposal (each pit is approximately 15 m in diameter).	Solvents, petroleum, oil, and lubricants (410,000 l).
Site 17: Power Plant No. 3 and Waste Oil Pit	1950 to 1981: An area (unknown size) downgradient of the power plant received waste oil until an unlined waste oil pit was constructed in the mid 1960s.	Waste turbine lubrication oil from the power plant (unknown quantities).
Site 20: Trout Creek Disposal Area Site 21A: White Alice Quarry Upper Disposal Area Site 22: White Alice PCB Spill Area	1980 to 1982: Demolition materials from the dismantling of the White Alice Complex, a military communications network, were dumped (unknown size).	7,600 l of transformer oil containing PCBs were allegedly dumped in one or all of the three areas.

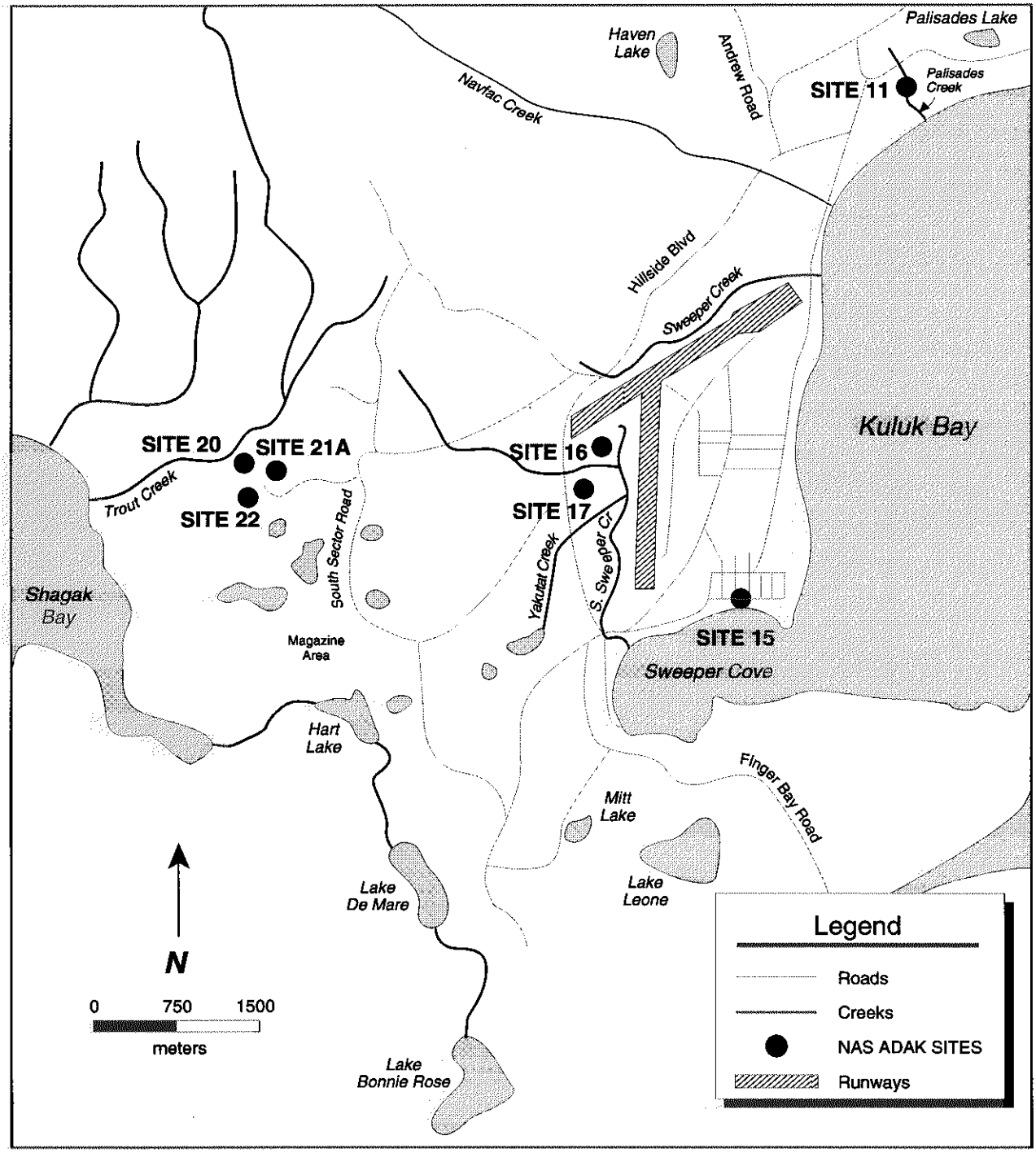

Figure 2. Location of seven waste sites at NAS Adak (URS 1991).

The Navy focused its pre-NPL investigations on the seven waste sites at NAS Adak (Figure 2). Site 11 (Palisades Lake Landfill) is located in a large ravine and the adjacent coastal upland area adjoining Kuluk Bay. Palisades Creek flows through the landfill before discharging into Kuluk Bay. Site 5 (Old Hazardous Waste Storage Area) is about 120 m north of Sweeper Cove on relatively flat ground. An unlined drainage channel along the east boundary of the site directs storm runoff from the northeast portion of the site toward Sweeper Cove. Site 16 (Firefighting Training Area and Burn Pits) is bordered to the east by South Sweeper Creek. Surface water from this site either accumulates in depressions or flows to South Sweeper Creek, which enters Sweeper Cove about 2 km downstream. Surface water from Site 17 (Power Plant No. 3 and Waste Oil Pit) drains into Yakutat Creek and flows for about 300 m before discharging into South Sweeper Creek. Site 20 (Trout Creek Disposal Area) consists of a steep hillside and a portion of the Trout Creek floodplain at the base of the hill. Trout Creek drains to Shagak Bay about 1.5 km from Site 20. Site 21A (the upper White Alice Quarry Disposal Area) is within 460 m of Trout Creek, which receives surface runoff from the site. Site 22 (White Alice PCB Spill Area) is situated on a level hilltop about 300 m from Trout Creek. Water drains from this site's hillsides in the form of seeps and springs, which discharge via drainage channels to Trout Creek to the north, and Shagak Bay to the southwest (URS 1991).

NOAA Trust Habitats and Species

Habitats of concern to NOAA are the surface water, bottom substrates, and associated wetlands of South Sweeper Creek, Yakutat Creek, and Trout Creek. Numerous unidentified streams that discharge to South Sweeper may also be of concern to NOAA. Secondary habitats of concern are the surface water and substrates of Shagak and Kuluk Bay, and Sweeper Cove.

South Sweeper Creek is the largest of the four creeks in the site investigations. The creek is a brackish (5 to 15 ppt), tidally influenced stream that flows in a southerly direction and discharges into Sweeper Cove. The creek was dredged periodically in the 1950s to alleviate hydric soil conditions within the area and is widest (about 6 m) at the point of discharge. Historically, the creek supported a run of coho salmon and was actively fished by sportsfishermen. Recently, the salmon run has declined substantially for unknown reasons. This creek also supports a Dolly Varden run (Fritz personal communication 1993). Stickleback in South Sweeper Creek represent an important component of the forage base. The creek is also presumed to support numerous estuarine infaunal invertebrates and forage fishes typical of sub-boreal latitudes. Beach wild rice (*Elymus arenarius*) is the predominant vegetation along the stream channels of South Sweeper Creek near the site (URS 1991; Klett personal communication 1993a).

Near Site 17, Yakutat Creek flows north-northeast before joining South Sweeper Creek. A spillway about 30 m upstream from the confluence of Yakutat and South Sweeper creeks limits all upstream migration of NOAA trust resources in Yakutat Creek. There are heavy stands of beach wild rice along Yakutat Creek. Areas of presumably oil-stained, stressed vegetation were observed during site investigation along Yakutat Creek (URS 1991). Additionally, Arctic rushes (Juncus articus) are found along the eastern portion of the site. Like South Sweeper Creek, Yakutat Creek presumably provides habitat for a variety of stream invertebrates and forage fish that are typical of temperate, sub-boreal, aquatic ecosystems (URS 1991; Klett personal communication 1993a).

Trout Creek is a perennial, rapidly flowing stream that averages 1 m and less wide. The creek meanders in a westerly direction north of Sites 20, 21A, and 22, and subsequently descends into Shagak Bay. The creek is well-oxygenated, maintains gravel substrates, and provides spawning and nursery habitat for Dolly Varden and pink salmon. Other fish, such as stickleback, also reside in Trout Creek. Wetlands associated with Trout Creek are seasonally flooded and characterized by emergent vegetation (URS 1991; Klett personal communication 1993a).

Palisades Creek, near Site 11, is a small, perennial, freshwater stream that is primarily fed by snowmelt and rain. The creek flows through Site 11, drops steeply, and descends into Kuluk Bay (an approximate 30 m drop at an approximate 60° angle). The extreme stream gradient makes the creek inaccessible to all NOAA trust resources (Klett personal communication 1993a).

Pink salmon (the most abundant species), chum salmon (the least abundant species), and coho, use the larger stream systems and surrounding marine water of Adak (Table 2). Sockeye salmon use the streams associated with lake habitat for spawning runs, depending on the species, from July through September. Chinook salmon do not use the local streams of Adak Island for spawning habitat. The anadromous variety of Dolly Varden is commonly found in Adak's streams and generally spawns from June through September, and subsequently over-winters in the local lake systems (Klett personal communication 1993a).

Pacific herring, Pacific ocean perch, ling cod, and rockfish, a popular recreational fishery, use the nearshore waters of Shagak and Kuluk bays and Sweeper Cove. Pacific halibut are commonly found in both intertidal nearshore and open-water offshore zones surrounding Adak Island. Pacific halibut is one of the island's most important commercial and recreational fisheries and is subject to restricted seasons (Klett personal communication 1993a).

Numerous marine mammals are both resident and frequent visitors to marine habitats surrounding Adak island. Three pinnipeds, the northern fur seal (*Callorhinus ursinus*), the federally threatened Steller sea lion (*Eumetopias jubata*), and the Pacific harbor seal (*Phoca vitulina linnaeus*), and the sea otter (*Enhydra lutris*) use

Table 2. Selected NOAA trust fish species that use surface water surrounding NAS Adak, Alaska.

Species		Habitat			Fisheries	
Common Name	Scientific Name	Spawning Ground	Nursery Ground	Adult Forage	Comm. Fishery	Recr. Fishery
ANADROMOUS FISH						
Pink salmon	*Oncorhynchus gorbuscha*	♦	♦	♦	♦	♦
Chum salmon	*Oncorhynchus keta*	♦	♦	♦	♦	♦
Coho salmon	*Oncorhynchus kisutch*	♦	♦	♦	♦	♦
Sockeye salmon	*Oncorhynchus nerka*	♦	♦	♦	♦	♦
Chinook salmon	*Oncorhynchus tshawytscha*			♦	♦	♦
Dolly varden	*Salvelinus malma*	♦	♦	♦		♦
MARINE FISH						
Pacific halibut	*Hippoglossus stenolepis*		♦	♦	♦	♦
Pacific herring	*Clupea harengus pallasi*	♦	♦	♦	♦	♦
Stickleback	*Gasterosteus* spp.	♦	♦	♦		
Ling cod	*Ophidon elongatus*	♦	♦	♦	♦	♦
Rockfish	*Sebastes* spp.	♦	♦	♦		♦
Pacific ocean perch	*Sebastes alutus*	♦	♦	♦		♦

marine habitats associated with the island (Klett personal communication 1993b).

Fur seals visit the water around the island in the spring when they migrate south from the Bering Sea and in the fall when they return north. They have been observed in Adak Strait west of the island as they pass through the Aleutians, but are not known to haul out on the island itself. Fur seals often feed close to shore and are unlikely to remain near the island over extended periods of time. Steller sea lions and Pacific harbor seals are year-round residents of the Aleutians and both feed close to shore, although harbor seals appear to be more restricted to coastal foraging than sea lions. Harbor seals frequently use Sweeper Cove, Clam Cove, Shagak Bay, and presumably, all embayments on the island. Harbor seals generally are less particular about where they haul out than are sea lions, but avoid people in their haulouts. Harbor seals are not adept climbers and prefer low flat rocks barely above the water for haulout locations. Steller sea lions use the waters around Adak for foraging and many terrestrial habitats in the western-central Andreanofs for haulouts and rookeries. One of the 24 Steller sea lion rookeries in the Aleutian Islands is located at Lake Point/ Cape Yakak, at the southern tip of the Yakak peninsula on southwest Adak Island. Rookery sites are most important in the summer breeding season for mating and pupping, but can be used year-round as haulouts. About 4,000 sea otters use the nearshore waters surrounding the base and are regular visitors to Clam Lagoon and Sweeper Cove (Klett personal communication 1993b).

All of the large cetaceans may pass through off Adak Island. The small- to medium-sized cetaceans would be more likely to come closer to shore to feed, but are highly mobile and would not linger there.

Site-Related Contamination

Data collected during the remedial investigation indicated that soils, groundwater, surface water, and sediments at NAS Adak contain elevated concentrations of site-related contaminants (URS 1991). The primary contaminants of concern to NOAA are trace elements, PAHs, and PCBs. The maximum concentrations of contaminants detected in media collected from the seven waste sites at NAS Adak are presented in Table 3.

At Site 11, trace elements were the major contaminants of concern. Groundwater samples collected from Site 11 contained copper and mercury at concentrations that exceeded their respective freshwater chronic AWQC by at least ten times. Concentrations of copper, mercury, and zinc in surface water also exceeded their respective AWQCs. Palisades Creek sediment collected downstream from the landfill contained the maximum concentrations of all trace elements, except for mercury, found in sediments collected from the seven waste sites (Table 3).

Data presented in the 1991 Draft RI may only be used to form a qualitative picture of contamination on the island. The concentrations reported below, therefore, may not accurately represent current levels of contamination. In addition, the Navy excavated sites 15, 20, and 21A during the fall of 1992. PCB-contaminated soils were removed from these areas and stockpiled in a central location.

Only soil and groundwater samples were collected at Site 15; groundwater from the site contained concentrations of copper, lead, mercury, silver, and PCBs that exceeded their respective AWQCs by at least ten times. Concentrations of copper (2,600 mg/kg), lead (1,600 mg/kg), and zinc (8,000 mg/kg) in surface soils were 100 times higher than U.S. average soil concentrations (Lindsay 1979). Elevated concentrations of total PAHs (280 mg/kg) and PCBs (5,900 mg/kg) were detected in surface soils collected from Site 15.

At Site 16, surface water contained concentrations of cadmium, chromium, copper, lead, and zinc that exceeded their respective AWQCs. Concentrations of cadmium, silver, and zinc in soils exceeded the average U.S. soil concentrations for those elements by more than 100 times. The PAH compound naphthalene was detected in soils (25 mg/kg) and in groundwater (5.6 µg/l) at Site 16. Elevated concentrations of PCBs were detected in soils (56 mg/kg) and groundwater (0.80 µg/l).

At Site 17, groundwater and surface water contained the maximum concentrations of chromium, copper, mercury, and nickel detected in samples collected from the seven waste sites (Table 3). Elevated concentrations of lead (1,100 µg/l), zinc (15,000 µg/l), naphthalene (5 µg/l), and PCBs (2.8 µg/l) were also detected in surface water samples collected from Site 17.

The maximum concentrations of PCBs in surface water, soil, and sediment from NAS Adak were

Table 3. Maximum concentrations of contaminants of concern at seven of the waste sites located at NAS Adak.

	Water			Soil		Sediment	
	Ground water µg/l	Surface Water µg/l	AWQC[1] µg/l	Soils mg/kg	Average U.S.[2] mg/kg	Sediment mg/kg	ER-L[3] mg/kg
INORGANIC SUBSTANCES							
Trace Elements							
Cadmium	6	30	1.1+	6.6	0.06	3.8	5
Chromium	650	230	11	850	100	100	80
Copper	1500	2900	12+	2600	30	540	70
Lead	90	1100	3.2+	3000	10	600	35
Mercury	0.3	5.7	0.012	1.4	0.03	0.73	0.15
Nickel	700	200	8.3	600	40	34	30
Silver	3	7	0.12	170	0.05	ND	1.0
Zinc	630	15,000	86	8000	50	890	120
ORGANIC COMPOUNDS							
PAHs							
Naphthalene	12	5.0	NA	25	NA	2.7	0.34
Total PAHs	77	5.0	NA	280	NA	18	4
PCBs							
Aroclor 1254	2.1	ND	0.014	ND	NA	ND	0.05
Aroclor 1260	0.8	18	0.014	9,000	NA	16,000	0.05

* These values are from the 1991 Draft RI. The Navy believes that there is considerable uncertainty in 1991 data quality. Contamination levels will be reevaluated during the RI.
1: Ambient water quality criteria for the protection of aquatic organisms. The lower value of the marine or freshwater chronic criteria are presented (EPA 1986), because waste sites are located near both marine and freshwater environments.
2: Lindsay (1979).
3: Effects range-low; the concentration representing the lowest 10 percentile value for the data in which effects were observed or predicted in studies compiled by Long and Morgan (1990).
ND: Not detected; detection limit not available.
NA: Screening guidelines not available.
+: Hardness-dependent criteria (100 mg/l $CaCO_3$ assumed).

found in samples collected from Sites 20, 21A, and 22. Concentrations of PCBs in surface water collected from the Trout Creek floodplain at Site 20 and from the hillside draining Site 22 were 18 µg/l and 6 µg/l, respectively. Maximum concentrations of PCBs in surface soils collected from Sites 20, 21A, and 22 were 16 mg/kg, 9,000 mg/kg, and 1,100 mg/kg, respectively. Sediments collected from the Trout Creek floodplain contained 16,000 mg/kg of PCBs.

Summary

High levels of PCBs, trace elements, and PAHs have been measured in on-site media. PCBs and some of the trace elements may have accumulated in resources of concern to NOAA. Site contaminants are also potentially toxic to NOAA resources. Although PCB-contaminated soils were removed from sites 15, 20, and 21A, PCBs may have migrated off-site in the past. Biological

receptors, sediments, and surface water in South Sweeper Creek, Trout Creek, Shagak Bay, and Kuluk Bay near Palisades Creek should be analyzed for contaminants of concern.

References

Environmental Science and Engineering, Inc. (ESEI). 1986. Initial Assessment Study of Naval Air Station, Naval Security Group Activity, and Naval Facility, Adak, Alaska. Port Hueneme, California: Environmental Restoration Department, Naval Energy and Environmental Support Activity.

Fritz, L., Biologist, National Marine Fisheries Service, Seattle, Washington, personal communication, April 19, 1993.

Klett, E.V., Biologist, U.S. Fish and Wildlife Service, Adak Island, Alaska, personal communications, February 10, 1993 and April 30, 1993.

Lindsay, W.L. 1979. *Chemical Equilibria in Soils.* New York: John Wiley & Sons. 449 pp.

Long, E.R. and L.G. Morgan. 1990. *The potential for biological effects of sediment-sorbed contaminants tested in the National Status and Trends Program.* NOAA Technical Memorandum NOS OMA-52. Seattle: Coastal and Estuarine Assessment Branch, National Oceanic and Atmospheric Administration. 175 pp. + appendices.

Science Applications International Corporation (SAIC). 1991. Resource Conservation and Recovery Act (RCRA) Facility Assessment, Preliminary Review/Visual Site Inspection Report, U.S. Naval Complex Adak, Adak Island, Alaska. Seattle: U.S. Environmental Protection Agency.

URS Consultants. 1991. Draft Final Remedial Investigation Report, Naval Air Station Adak, Adak Island, Alaska. Seattle: Engineering Field Activity Northwest, Naval Facilities Engineering Command.

U.S. EPA. 1986. *Quality criteria for water.* EPA 440/5-87-003. Washington, D.C.: Office of Water Regulation and Standards, Criteria and Standards Division, U.S. Environmental Protection Agency.